GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Hydraulics II, PG_00058794		
Field of study	Environmental Engineering		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2023/2024
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	4	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Geotechnical and Hydraulic Engineering -> Faculty of Civil and Environmental Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Katarzyna Weinerowska-Bords	
	Teachers	dr hab. inż. Katarzyna Weinerowska-Bords dr inż. Patrycja Mikos-Studnicka	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	30.0	0.0	0.0	60

E-learning hours included: 0.0

Additional information:
The course https://enauczanie.pg.edu.pl/moodle/course/view.php?id=35374 (HYDRAULIKA II dla IŚ sem.4 (stacj. IŚ 2023/24 LATO) on the GUT e-learning platform is assigned to the subject

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	60	7.0	58.0	125

Subject objectives

Familiarizing students with the theoretical foundations, calculation methods and practical applications of hydraulics in the field of filtration, flows in open channels and flows through weirs and orifaces, as well as acquiring practical skills in selecting the methodology and conducting hydraulic calculations and measurements.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U02] can work individually and in a team; knows how to estimate the time needed to complete the task ordered; is able to develop and implement a work schedule that ensures deadlines	Student is able to cooperate in a team in laboratory measurements , in processing the results and preparing reports. The student is able to analyze the purpose of the task, select methods and plan a work schedule.	[SU2] Assessment of ability to analyse information [SU5] Assessment of ability to present the results of task [SU1] Assessment of task fulfilment
[K6_W05] knows the theoretical basis of hydromechanics and its practical models, necessary to solve technical problems in the field of environmental engineering (sanitary engineering, water melioration, water management and flood protection, pollution spread)	The student knows the basics of hydraulics in the field of general hydraulics, flows in pressurized pipes, flows in open channels, filtration flows, outflow from holes, flows through an overflow. The student understands and is able to indicate the applications of hydraulics in sanitary engineering, hydrology and water management.	[SW1] Assessment of factual knowledge
[K6_U08] can use properly selected methods and devices of hydraulics and hydrology, enabling determination of basic quantities characterizing the flow of water in open channels and rivers, pipelines and flow objects of environmental engineering	The student applies measurement methods and computational tools needed to perform accounting tasks and experiments in the hydraulic laboratory. The student is able to determine, by measurement and calculation, flow rates, flow speed, pressure and other required quantities.	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment
[K6_K01] can think and act in a creative and enterprising way; can set priorities for the implementation of an individual or group task; understands the need for continuous training and professional responsibility for their activities and team	The student is able to analyze the purpose of the task, determine the priorities of his work, and find the necessary information. He understands the meaning of his actions, the consequences of an engineer's work and the need to verify the methods used as technology develops.	[SK2] Assessment of progress of work [SK1] Assessment of group work skills [SK3] Assessment of ability to organize work [SK5] Assessment of ability to solve problems that arise in practice
[K6_W14] knows and understands the methods of measuring basic quantities characteristic for fluid mechanics and hydraulics, hydrology; knows the calculation methods and IT tools necessary to analyze the results of laboratory and field work	The student knows measurement methods and computational tools needed to perform accounting tasks and experiments in the hydraulic laboratory.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects

Subject contents

Lecture:Flow in a porous media (filtration). 1D flow description, the concept of filtration velocity, continuity equation, Darcy's equation. Filtration coefficient. Introduction to water flow in open channels - basic concepts and classifications. Velocity distributions in open channels. Description of 1D flow in open channels - basic equations. Unsteady flow equations (dynamic wave model) and their simplifications. 1D steady flows in open channels. Bernoulli's equation. Manning's equation. Uniform steady flow in open channels. The concept of critical movement and critical depth. Froude number. subcritical and supercritical flow in open channels. Non-uniform flows in open channels - equations, examples, applications. Hydraulic jump. Venturi channels. Flow through weirs. Orifaces. Basics of hydraulics of cubature facilities.

Laboratory: Reynolds experiment, Venturi tube testing, filtration flows, pump testing, flows in open channels, flow from orifaces. Computational tasks regarding flow in channels, flow through weirs, outflow from orifaces.

Prerequisites and co-requisites

basic knowledge of physics and mathematics. Knowledge of hydraulics from the 3rd semester

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
exam	60.0%	60.0%
grade for laboratory tasks and final laboratory test	60.0%	40.0%

Recommended reading	Basic literature	1. Materials and conspects of lectures. 2. Instructions for laboratory tasks. 3. Sawicki Jerzy M. "Mechanika przepływów", Wydawnictwo Politechniki Gdańskiej 4. Weinerowska-Bords K. "Hydraulika do poćwiczenia", Wydawnictwo Politechniki Gdańskiej, Gdańsk 2023
	Supplementary literature	1. Kubrak J., Kubrak E. "Podstawy obliczeń z mechaniki płynów w inżynierii i ochronie środowiska", Wydawnictwo SGGW Warszawa 2. Kubrak E., Kubrak J. "Hydraulika techniczna. Przykłady obliczeń.", Wydawnictwo SGGW Warszawa 3. Amanowicz Ł., Schiller T. "Mechanika płynów w inżynierii środowiska", Wydawnictwo Politechniki Poznańskiej, Poznań 2022 4. Puzyrewski R., Sawicki J. "Podstawy mechaniki płynów i hydrauliki", Wydawnictwo Politechniki Gdańskiej
	eResources addresses	Podstawowe https://enauczanie.pg.edu.pl/moodle/course/view.php?id=35374 - course on GUT e-learning platform Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Sample laboratory tasks:- Reynolds experience- Venturi tube testing- filtration flow analysisSample questions from the lecture part are available on the e-course.	
Work placement	Not applicable	